



Citation for published version:

McEwan, D 2019, 'The effects of perceived teamwork on emergent states and satisfaction with performance among team sport athletes', *Sport, Exercise, and Performance Psychology*. <https://doi.org/10.1037/spy0000166>

DOI:

[10.1037/spy0000166](https://doi.org/10.1037/spy0000166)

Publication date:

2019

Document Version

Peer reviewed version

[Link to publication](#)

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Title: The Effects of Perceived Teamwork on Emergent States and Satisfaction with Performance among Team Sport Athletes

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Acknowledgements:

Funding for this research was provided by the University of British Columbia as well as a Canadian Graduate Scholarship (doctoral) from the Social Sciences & Humanities Research Council of Canada. I would also like to acknowledge Drs. Mark Beauchamp, Bruno Zumbo, and Mark Eys for their support and tutelage in carrying out this research.

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Abstract

Although teamwork has been shown to be an important group variable across a range of team contexts, corresponding research within the context of sport has not yet been conducted. As such, the purpose of this study was to examine the relationships between team sport athletes' perceptions of teamwork behaviours with several individual and group variables within sport. A sample of 178 team sport athletes completed the *Multidimensional Assessment of Teamwork in Sport* (MATS), which measures five aspects of teamwork. One month later, participants completed measures of team cohesion, collective efficacy, satisfaction with both team and individual performance, enjoyment in one's sport, and commitment to one's team. The correlations between each of the five aspects of teamwork with the six external variables were significant ($p < .001$). Large effect sizes were found for the correlations between athletes' perceptions of teamwork and their satisfaction with team performance, task cohesion, and collective efficacy. Medium effect sizes were shown with social cohesion. Small-to-medium effect sizes were evident with satisfaction with individual performance, commitment to one's team, and enjoyment in one's sport. The relationships between each aspect of teamwork and satisfaction with team performance were mediated by task cohesion, social cohesion, and collective efficacy. The relationships between four of the five aspects of teamwork and satisfaction with individual performance were mediated by enjoyment and commitment. The results of this study suggest that teamwork is an important variable to consider within the context of sport.

Keywords: Emergent states; Mediators; Processes; Teamwork; Validity

The Effects of Perceived Teamwork on Emergent States and Satisfaction with Performance among Team Sport Athletes

The ability of team members to work well together has been identified as a significant aspect of team effectiveness across a range of group contexts, such as business, health care, military, and academic settings (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008; Mathieu, Maynard, Rapp, & Gilson, 2008). Specifically, the group-level construct of teamwork has been shown to be associated with various group constructs, including team cohesion (i.e., the extent to which team members are united around their group objectives), collective efficacy (i.e., the confidence a team has in its collective abilities to perform team tasks), and, ultimately, team performance (LePine et al., 2008). In addition to these group variables, team members' perceptions of teamwork behaviors have also been found to be positively related to various individual-level constructs such as commitment to one's team (Rafferty, Ball, & Aiken, 2001), enjoyment/satisfaction within one's job/role on a team (LePine et al., 2008; Rafferty et al., 2001), and, ultimately, individual team member performance (Stevens & Campion, 1999).

Despite the evidence suggesting that teamwork is an important variable to consider when studying teams, research on this behavioral construct within the context of sport has been surprisingly sparse. In an attempt to stimulate research in this context, McEwan and Beauchamp (2014) conducted a theoretical and integrative review of the research on teamwork behaviors in other contexts as well as the limited extant work conducted to date within sport. This resulted in the provision of a working definition as well as a theoretical framework of teamwork in sport. Specifically, teamwork was conceptualized as "a collaborative effort by team members to effectively carry out the independent and interdependent behaviors that are required to maximize a team's likelihood of achieving its purposes" (McEwan & Beauchamp, 2014, p. 233). The multidimensional framework was largely informed by a prominent framework of teamwork

behaviors put forward by Rousseau, Aubé, and Savoie (2006)—which itself was based on a comprehensive review of 29 models that have been used to study teamwork behaviors in other team contexts (e.g., health care, aviation, business)—and adapted for use with sports teams.

There are five overarching components of teamwork—*preparation*, *execution*, *evaluation*, *adjustments*, and the *management of team maintenance (MTM)*—which are comprised of 14 behavioral dimensions (McEwan & Beauchamp, 2014). *Preparation* involves behaviors that occur in advance of a team task, which includes specifying a team’s mission/reasons for being together (‘mission analysis’), team goals (‘goal specification’), and team strategizing (‘planning’). *Execution* involves behaviors that are enacted during a team task, including ‘communication’, ‘cooperation’, and ‘coordination’ between members. *Evaluation* and *adjustments* occur after a team task. Evaluation involves assessing team performance on a previous team task (‘performance monitoring’) as well as the various conditions affecting that performance (‘systems monitoring’). Adjustments are then enacted in response to the team’s evaluation and include deliberating how team performance can be improved (‘problem solving’), implementing novel strategies to enhance team functioning (‘innovation’), providing performance-related verbal feedback to teammates (‘intrateam coaching’), and enacting behaviors that help teammates perform their roles (‘backing up’). Finally, *MTM* involves behaviors associated with keeping the team together and ensuring that personal and/or interpersonal issues do not preclude a team from functioning effectively; this includes dealing with conflict between members (‘integrative conflict management’) and providing interpersonal support to one another (‘psychological support’).

The teamwork in sport framework was also embedded within a broader *Input-Mediator-Outcome (IMO)* model of team effectiveness (Mathieu et al., 2008) in order to illustrate how teamwork relates to other salient constructs. *Inputs* are described as individual (e.g., members’

personalities, skills), team (e.g., team size, teamwork training), and environmental (e.g., league rules, cultural influences) variables that can impact the interactions between team members (Mathieu et al., 2008). *Mediators* include both team *processes* as well as *emergent states*. Team processes entail team member behaviors and interactions (e.g., teamwork), while emergent states refer to members' cognitive, motivational, and affective states (e.g., team cohesion, commitment to one's team)—these states develop over time as a result of the aforementioned processes/interactive behaviors between members (Mathieu et al., 2008; Marks et al., 2001). For example, as team members learn and improve the extent to which they work effectively together, they may become more committed to their team and more united in pursuit of their goals. These processes and, in turn, emergent states are proposed to predict the extent to which teams achieve various *outcomes*, which are the resulting outputs of team activities that are valued by the team and/or its members (e.g., performance, member satisfaction; Mathieu et al., 2008; McEwan & Beauchamp, 2014). Since teams are said to “exist to perform tasks” (Mathieu et al., 2008, p. 415), it is perhaps unsurprising that performance has been the most commonly studied criterion within various contexts of team psychology (Bommer, Johnson, Rich, Podsakoff, & MacKenzie, 1995; Mathieu et al., 2008).

Building on this foundational base, McEwan, Zumbo, Eys, and Beauchamp (2018) developed a conceptually- and psychometrically-sound measure of teamwork, entitled the *Multidimensional Assessment of Teamwork in Sport (MATS)*. This questionnaire measures the 14 aforementioned dimensions of teamwork and can also be used to derive scores on each of the five overarching aspects. Preliminary evidence provided support for the reliability as well as content, substantive, and structural validity of data derived from the MATS (McEwan et al., 2018). However, it remains to be ascertained whether (and the extent to which) teamwork is associated with other salient variables in sport. This research is critical from a construct validation

perspective, as it tests the *external* component of validity, which concerns the degree to which data derived from a focal construct (in this case, teamwork) are related to other theoretically-relevant constructs (cf. Messick, 1995).

Within the theoretical framework of teamwork in sport provided by McEwan and Beauchamp (2014), it is suggested that teamwork predicts an array of group and individual emergent states and outcomes. As mentioned, the relationships between teamwork with these emergent states—including team cohesion and collective efficacy—and outcomes—including team performance and member satisfaction—have been found across several team contexts outside of sport (e.g., LePine et al., 2008; McEwan, Ruissen, Eys, Zumbo, & Beauchamp, 2017). In addition, the predictive effects of various emergent states on team and individual outcomes have been shown with sport teams (e.g., Barnicle & Burton, 2016; Carron, Colman, Wheeler, & Stevens, 2002; Heuzé, Raimbault, & Fontayne, 2006; Myers, Feltz, & Short, 2004). For example, a meta-analysis by Carron et al. (2002) found that team cohesion was a significant predictor of team performance in sport. However, an examination of whether—and the extent to which—teamwork acts as an antecedent to the various emergent state–performance relationships in sport has not yet been conducted.

The Current Study

In light of the potential importance of teamwork within sport (based on corresponding research on teamwork within other team contexts), the purpose of this study was to examine the relationships between team sport athletes' perceptions of teamwork (including preparation, execution, evaluation, adjustments, and MTM) and six salient constructs in sport. These included a group outcome of satisfaction with team performance, two group emergent states of team cohesion and collective efficacy, an individual outcome of satisfaction with one's personal performance, and two individual emergent states of commitment to one's team and enjoyment in

one's sport. As a primary hypothesis, it was anticipated that significant, positive correlations would emerge between the five aspects of teamwork (preparation, execution, evaluation, adjustments, and MTM) with these six external variables. Such relationships have been shown in other team contexts (e.g., LePine et al., 2008; Rafferty et al., 2001; Stevens & Campion, 1999) and, thus, it was predicted that these results would extend to sport settings.

Potential mediating effects between the five aspects of teamwork (as antecedents) and satisfaction with both team and individual performance (as outcomes) were also examined. Specifically, it was hypothesized that athletes' perceptions of teamwork would predict their satisfaction with their team's performance via the emergent states of team cohesion (both task and social) and collective efficacy. It was also hypothesized that perceived teamwork would predict satisfaction with individual performance via enjoyment in one's sport and commitment to one's team. Although objective measures may be ideal for estimating team and individual performance, such assessments are challenging to obtain with the context of team sports (Al-Yaaribi, Kavussanu, & Ring, 2016), especially when sampling from several types of sports. Moreover, team member satisfaction has been examined as a prominent criterion in the teamwork literature (e.g., LePine et al., 2008). As such, a self-report measure of satisfaction with team and individual performance was used to examine this outcome. These proposed relationships were guided by the framework of team effectiveness by McEwan and Beauchamp (2014), by previous findings on teamwork in other team contexts (e.g., Mathieu et al., 2008; LePine et al., 2008; Rousseau et al., 2006), as well as by previous research within sport on the relationships between the aforementioned mediating variables and performance outcomes (e.g., Barnicle & Burton, 2016; Carron et al., 2002; Myers et al., 2004). In summary, each test for mediation followed the proceeding model: teamwork → emergent state → satisfaction with performance.

Methods

Participants

The sample for the current study consisted of 178 athletes (85% males) from 19 Canadian sports teams, who completed questionnaires at both time 1 and time 2 (see below). Five teams were adult-aged (≥ 18 years), while the remaining 13 were adolescents (mean age = 17.3 years, $SD = 8.3$, range = 13 – 73). These teams competed in a range of sports, including hockey (five), baseball (five), curling (three), water polo (two), volleyball (one), rugby (one), lacrosse (one), and soccer (one). The majority of the athletes came from competitive teams ($n = 16$) who were selected following team tryouts to compete predominantly against other teams within their local region (often known in Canada as ‘rep’ teams), while two teams competed at the provincial level, and one competed at the inter-University level.

The sample size required to carry out the planned mediation analyses (see Analytic Strategy section below) was guided by recommendations from Fritz and MacKinnon (2007). Based on previous findings with regard to the relationships between (a) teamwork and emergent states (LePine et al., 2008), and (b) emergent states with performance (e.g., Barnicle & Burton, 2016; Carron et al., 2002; Myers et al., 2004), a minimum of 116 participants was necessary for a power estimate of $\beta = .80$. As such, the final sample size of 178 athletes was deemed appropriate to address the purposes of this study.

Procedure

Following institutional research ethics board approval, team coaches or managers were contacted over email via publicly-available contact information and asked to participate in the study. The researcher met with teams whose coaches indicated that they would be interested in participating in the study at an approximate halfway point of the team’s season—this typically occurred 4 – 5 months following the commencement of the season (range = 2 – 6 months). Two

study sessions—each lasting approximately 15 – 20 minutes—were scheduled before or after a team’s practice at team practice facilities. For participating teams whose athletes were under the age of 18, passive consent was obtained from parents wherein they were able to opt their child out of the study prior to the first study session (no instances of opt out occurred). At the first study session, participants provided informed consent and then completed a demographic form as well as the teamwork in sport questionnaire (see below). The second session took place approximately one month following the time 1 assessment, where participants completed measures of team cohesion, collective efficacy, satisfaction with team performance, enjoyment in one’s sport, commitment to one’s team, and satisfaction with individual performance. Two measures of reliability are provided for all measures, below: ordinal composite reliability (Zumbo, Gadermann, & Zeisser, 2007) and Cronbach’s alpha (Cronbach, 1951).

Materials

Time 1. At the first session of the study, participants completed the *MATS*, a 66-item questionnaire that examines each of the 14 dimensions of teamwork at the group level (i.e., athletes’ perceptions of teammate behaviors; McEwan et al., 2018). Each item is scored on a 7-point Likert-type scale from 1 (strongly disagree) to 7 (strongly agree). The preparation subscale measures the dimensions of ‘mission analysis’ (5 items; e.g., “our team has specified a mission on which all members agree”), ‘goal specification’ (6 items; e.g., “we set challenging team goals”), and ‘planning’ (6 items; e.g., “we make action plans for how we will achieve our team goals”). The execution subscale examines the ‘coordination’ (4 items; e.g., “team members execute their tasks with the correct timing”), ‘cooperation’ (4 items; e.g., “team members help each other when needed”), and ‘communication’ (5 items; e.g., “team members communicate in a clear manner”) dimensions. The evaluation subscale consists of the ‘performance monitoring’ (6 items; e.g., “we evaluate our progression towards team goal accomplishment”) and ‘systems

monitoring' (4 items; e.g., "we monitor external factors that may impact our team") dimensions. The adjustments subscale measures the dimensions corresponding to 'problem solving' (4 items; e.g., "if our team is unsuccessful, we identify the reasons why this has occurred"), 'innovation' (4 items; e.g., "we utilize new tactics when previous plans prove to be unsuccessful"), 'intrateam coaching' (4 items; e.g., "members of this team take time to give advice to each other on their personal performance"), and 'backing up' (5 items; e.g., "teammates take time to help other members perform better"). Finally, the MTM subscale assesses the 'integrative conflict management' (4 items; e.g., "conflicts are resolved in a time-efficient manner") and 'psychological support' (5 items; e.g., "members provide support to teammates who are experiencing personal struggles") dimensions.

Participants' perceived level of teamwork was assessed by calculating their mean observed scores (from 1 to 7) on each of the dimensions within each respective subscale (e.g., a score for execution was provided by calculating participants' mean coordination, cooperation, and communication scores). Higher observed scores reflect higher perceived levels of teamwork. Evidence of content, substantive, and structural validity, as well as reliability and good model-data fit, has been demonstrated for each of the five measurement models corresponding to the preparation, execution, evaluation, adjustments, and MTM aspects of teamwork (McEwan et al., 2018). In the current study, ordinal composite reliabilities (Zumbo et al., 2007) ranged from .91 (mission analysis, performance monitoring, and systems monitoring) to .96 (psychological support). Cronbach's alpha values ranged from .87 (systems monitoring and problem solving) to .95 (psychological support).

Time 2. To examine team cohesion, adult participants (5 teams, 37 athletes) completed the 18-item *Group Environment Questionnaire* (GEQ; Carron, Widmeyer, & Brawley, 1985), while adolescent participants (13 teams, 141 athletes) completed the 18-item *Youth Sport Environment*

Questionnaire (YSEQ; Eys, Lougheed, Bray, & Carron, 2009). Measures of task cohesion (the extent to which team members are united around their team's *instrumental* objectives) as well as social cohesion (the extent to which team members are united around the group's *social* activities/relationships) are provided (Carron et al., 1985; Eys et al., 2009). In both questionnaires, items are scored on a 9-point scale, from 1 (strongly disagree) to 9 (strongly agree); higher scores on the two measures indicate greater perceptions of task and social cohesion. Support has been shown for the validity and reliability of data derived from both the GEQ (Carron et al., 1985) and the YSEQ (Eys et al., 2009). It should be noted that although the GEQ can measure four aspects of cohesion (specifically, individuals' attractions to a group's task and social objectives as well as their perceptions of the group as a whole on these two types of objectives; cf. Carron et al., 1985), it has often been conceptualized as social cohesion and task cohesion (such as within the prominent meta-analysis by Carron et al., 2002). Moreover, when separated into these four subscales in the current study, the reliability estimates for Attractions to the Group – Task (.51) and Group Integration – Task (.66) were particularly problematic (cf. Cortina, 1993; Zumbo et al., 2007). As such, the GEQ items were separated into social cohesion and task cohesion. In the current study, ordinal composite reliability scores for measures of the GEQ were .89 for task cohesion and .88 for social cohesion, while Cronbach's alpha values were .87 for task cohesion and .82 for social cohesion. For the YSEQ, ordinal composite reliability scores were .90 for task cohesion and .85 for social cohesion, while Cronbach's alpha was .95 for task cohesion and for .92 social cohesion.

The *Collective Efficacy Questionnaire for Sports* (Short, Sullivan, & Feltz, 2005) was used to measure collective efficacy. Specifically, the 4-item *Ability* subscale of this questionnaire examines participants' confidence in their team's collective ability to outperform opposing teams, as this was the variable of interest with regard to athletes' perceptions of collective efficacy.

Items are scored on a 10-point scale from 1 (not at all confident) to 10 (extremely confident); thus, higher scores indicate higher levels of collective efficacy. Previous studies have found support for the reliability and validity related to data derived from this instrument (Short et al., 2005). In the current study, ordinal composite reliability was .97 and Cronbach's alpha was .96.

The *Athlete Satisfaction Questionnaire* (Reimer & Chelladurai, 1998) was used to measure participants' satisfaction with performance. Athletes' satisfaction with their team's performance was assessed with the 3-item *Team Performance* subscale of this instrument. Satisfaction with one's individual performance was examined with the 3-item *Individual Performance* subscale. Items are scored using a 7-point scale from 1 (not at all satisfied) to 7 (extremely satisfied), with higher scores indicating greater satisfaction with performance. Support for the reliability and validity of data derived from both subscales of this questionnaire have been shown (Reimer & Chelladurai, 1998). For satisfaction with team performance, ordinal composite reliability in the current study was .95 and Cronbach's alpha was .90. For satisfaction with individual performance, ordinal composite reliability was .91 and Cronbach's alpha was .84.

The *Sport Commitment Model* (Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993) was used to measure participants' ratings of enjoyment in their sport as well as their commitment to their team. The 4-item *Sport Enjoyment* subscale was used to measure enjoyment. Items from this subscale are scored on a 5-point scale from 1 (not at all) to 5 (very much). The 4-item *Sport Commitment* subscale was used to measure commitment. Three of the items from this subscale are measured on a 5-point scale from 1 (not at all) to 5 (very much), while one item is measured on a separate 5-point scale from 1 (nothing at all) to 5 (a lot of things). Higher scores on both subscales reflect higher levels of enjoyment and commitment. Evidence of reliability and validity of data derived from both subscales of this instrument has been found (Scanlan et al., 1993). In

the current study, ordinal composite reliability was .96 for enjoyment and .92 for commitment, while Cronbach's alpha was .93 for enjoyment and .89 for commitment.

Analytic Strategy

Data were analyzed using *SPSS* software (Version 24; IBM SPSS Predictive Analytics, Chicago IL). After checking for normality and missing data, descriptive statistics were represented by calculating sample sizes, means, and standard deviations for each variable. Bivariate correlations (r) were calculated between the five aspects of teamwork with: satisfaction with team and individual performance; task and social cohesion; collective efficacy; enjoyment; and commitment. Correlations of .1, .3, and .5 correspond to small, medium, and large effect sizes, respectively (Cohen, 1992).

To examine the potential mediating relationships, the PROCESS SPSS macro was used, with bootstrapping set at 5000 samples (Hayes, 2013). Bootstrapping is recommended in mediation analyses with small sample sizes to help reduce the risk of type 1 error (Fritz & MacKinnon, 2007). The PROCESS macro handles missing data using listwise deletion and simultaneously tests both the direct effects of the independent variable (teamwork) on the dependent variables (satisfaction with team or individual performance) as well as the indirect effects of this relationship via the mediating variables (cohesion, collective efficacy, enjoyment, or commitment). These effects are significant if the resulting 95% confidence interval does not contain zero. Effect sizes are also estimated with completely standardized indirect effects (CSIE), with values of .01, .09, and .25 representing small, medium, and large effects, respectively (Cohen, 1992).

As there are five aspects of teamwork, five separate mediation models were carried out to assess whether each of these aspects predicted a mediating variable, which, in turn, predicted satisfaction with performance. For example, to measure whether teamwork predicted satisfaction

with team performance via task cohesion, the first model included scores of preparation as the independent variable (i.e., preparation → task cohesion → satisfaction with team performance). Similar models were then carried out with execution, evaluation, adjustments, and MTM as the independent variables. This process was repeated for each of the other mediation analyses.

Results

Prospective Correlational Relationships

Missing data, means, standard deviations, as well as the bivariate correlations among all variables are shown in Table 1. Listwise deletion was considered appropriate to handle missing data in this dataset as less than 5% of data for each measure were missing (cf. Schafer, 1999; Tabachnick & Fidell, 2001). Large, significant ($p < .001$) effect sizes were evident for the correlations between perceptions of teamwork and task cohesion¹ ($r = .49 - .69$), collective efficacy ($r = .50 - .63$), and satisfaction with team performance ($r = .48 - .61$). A medium, significant ($p < .001$) effect size was shown between perceived teamwork and social cohesion¹ ($r = .33 - .36$). Small to medium, significant ($p < .001$) effect sizes were shown between perceptions of teamwork and satisfaction with individual performance ($r = .23 - .35$), commitment to one's team ($r = .19 - .37$), and enjoyment in one's sport ($r = .20 - .32$).

Mediators of Teamwork and Satisfaction with Team Performance

As shown in Table 2 presenting the mediation tests of task cohesion¹, all aspects of teamwork had significant, direct effects on satisfaction with team performance ($B = .22 - .36$). Teamwork also had significant, indirect effects on satisfaction with team performance via task

¹ Note: It is recognized that cohesion is measured with two different questionnaires based on participant age range (as noted in the Methods section). Specifically, the YSEQ is used with adolescent athletes and the GEQ is used with adult athletes. It should be noted that the results between teamwork and cohesion (in terms of both prospective correlations and mediation effects) were very similar for both the YSEQ and the GEQ and the overall findings did not change when the data from both questionnaires/age groups were combined. Therefore, for ease of reading, an amalgamated score for both social cohesion and task cohesion is presented throughout the results section.

cohesion ($B = .39 - .50$), with these effect sizes in the large range ($B = .28 - .37$). With regard to social cohesion¹ (see Table 3), it was shown that all aspects of teamwork had significant, direct effects on satisfaction with team performance ($B = .53 - .69$). Teamwork also had significant, indirect effects on satisfaction with team performance via social cohesion ($B = .09 - .14$), with these effect sizes in the approximate small to medium range ($B = .07 - .10$). Regarding collective efficacy (see Table 4), all aspects of teamwork had significant, direct effects on satisfaction with team performance ($B = .23 - .40$). Teamwork also had significant, indirect effects on satisfaction with team performance via collective efficacy ($B = .31 - .52$), with these effect sizes in the large range ($B = .29 - .37$). Taken together, these findings suggest that the relationships between teamwork and satisfaction with team performance are partially mediated—to a large extent—by the extent to which team members are (a) united around their task purposes and (b) confident in the team's ability to be successful, as well as—to a small to medium extent—by the degree to which team members are united around their social objectives.

Mediators of Teamwork and Satisfaction with Individual Performance

As shown in Table 5 examining the mediating effect of enjoyment, teamwork had significant, direct effects on satisfaction with individual performance ($B = .12 - .21$). Significant, indirect effects were also found on satisfaction with individual performance via enjoyment for the preparation, execution, adjustments, and MTM aspects of teamwork ($B = .07 - .12$), with these effects in the small to medium range ($B = .08 - .12$). The indirect effect in the model examining the evaluation aspect of teamwork was similar but not significant, as the confidence interval ($-.01 - .17$) crossed zero. With regard to commitment (see Table 6), teamwork had significant, direct effects on satisfaction with individual performance ($B = .14 - .21$). Similar to the above-noted findings of enjoyment, there were significant, indirect effects on satisfaction with individual performance via commitment for the preparation, execution, adjustments, and MTM aspects of

teamwork ($B = .05 - .11$), with these effects in the small to medium range ($B = .06 - .12$). The indirect effect in the model for the evaluation aspect of teamwork was similar but not significant, as the confidence interval ($-.01 - .15$) crossed zero. Taken together, these findings suggest that the extent to which athletes enjoyed participating in their sport and were committed to their team partially mediated the relationships of teamwork preparation, execution, adjustments, and MTM (but not evaluation) on satisfaction with individual performance.

Discussion

The purpose of this study was to examine potential prospective and mediating relationships between athletes' perceptions of teamwork and their ratings on several salient variables in sport. Although previous studies have examined correlates of teamwork across an array of team settings, the present study is notable as it appears to be the first to examine these external relationships within the context of sport. First, it was hypothesized that perceived teamwork would be positively related to various group constructs—team cohesion, collective efficacy, and satisfaction with team performance—and individual variables—enjoyment within one's sport, commitment to one's team, and satisfaction with one's individual performance—which were measured approximately one month thereafter. Second, it was hypothesized that athletes' perceptions of teamwork would predict their satisfaction with team performance via team cohesion (both task and social) and via collective efficacy. Finally, it was anticipated that perceived teamwork would also predict athletes' satisfaction with their own individual performance via enjoyment in their sport and via commitment to their team. The results pertaining to each of these hypotheses are discussed in turn below.

Prospective Relationships

The hypotheses regarding the positive prospective relationships between perceived teamwork and the six external variables were supported, which corroborates previous findings

from other team contexts on correlates of teamwork (e.g., LePine et al., 2008; Mathieu et al., 2008; Rafferty et al., 2001; Stevens & Campion, 1999). Thus, the extent to which sport team members believe their teammates work well together appears to correlate (to a large extent) with the degree to which they are: (a) united around the team's task purposes, (b) confident in their team's collective abilities to be successful in their sport, and (c) satisfied with their team's performance. Moreover, athletes' perceived teamwork appears to be correlated (to a small to moderate extent) with the degree to which they: (a) believe that their team members are united around its social activities; (b) enjoy participating in their sport; (c) are committed to their team; and (d) are satisfied with their personal performance in their sport. The smaller correlations that were evident between teamwork and the individual-level measures (i.e., enjoyment, commitment, satisfaction with individual performance) compared to most of the group-level variables (i.e., collective efficacy, task cohesion, satisfaction with team performance) are perhaps unsurprising given that teamwork was conceptualized and measured as a group construct (cf. McEwan et al., 2018; Rousseau et al., 2006). Hence, one might expect an athlete's ratings on group constructs to be correlated to a greater extent with each other than with individual variables. These results align with findings from previous meta-analytic research (LePine et al., 2008), which has demonstrated stronger correlations of teamwork with group-level variables (e.g., cohesion) compared to individual-level variables (e.g., member satisfaction).

It is also worth noting that the sizes of the prospective relationships between athletes' ratings of teamwork and task cohesion were larger than those between perceived teamwork and social cohesion. At this point, one can only speculate why this finding occurred since (a) these results were cross-sectional and (b) most of the previous research on teamwork and cohesion in other team contexts appears to have used an amalgamated/omnibus measure of team cohesion (e.g., LePine et al., 2008). However, it would seem reasonable to hypothesize that this finding

emerged due to teamwork reflecting the extent to which team members work well together in order to *achieve the team's purposes* (cf. McEwan & Beauchamp, 2014). Since the purposes of competitive sports teams (which were the types of teams included in this sample) often focus on fulfilling *task* or *instrumental* objectives (e.g., performing well as a team, winning games or competitions), it is perhaps unsurprising that athletes' perceptions of teamwork would tie more closely to the extent to which they feel their team is united around those instrumental purposes (i.e., task cohesion) as opposed to around its social objectives/interpersonal relationships (i.e., social cohesion). Future research could examine whether similar findings exist with less competitive teams (e.g., intramural or recreational sports teams) whose purposes may be more focused on social objectives (e.g., to make friends, to have fun while being active).

Mediating Effects with Group Variables

With regard to group variables, the results from this study not only suggest that athletes' perceptions of teamwork predict their satisfaction with their team's performance, but also provide evidence that these relationships are explained by their perceptions of team cohesion as well as collective efficacy. Specifically, large indirect effects of task cohesion were shown for the teamwork–performance relationship. In other words, athletes who perceive that members of their team work effectively together appear to have a greater feeling of unity around their team's task purposes, which, in turn, predicts the extent to which they are satisfied with that team's performance. In addition, significant mediating effects were also shown for social cohesion, albeit to a lesser extent (that is, to a small to medium effect). Thus, when athletes believe that their teammates work well together, they will be more likely to perceive a greater sense of unity around the team's social objectives and, thereby, experience greater satisfaction with their team's performance. Similar to what was noted in the previous paragraph, the relatively smaller mediating effects of social cohesion (compared to task cohesion) may be due to the construct of

teamwork being more closely related to the instrumental objectives of a team rather than its social objectives. These results corroborate and extend the findings from previous research on (a) teamwork in team settings outside of sport, as well as (b) the predictive relationship between team cohesion and team performance in sport. Specifically, a meta-analytic review found that various aspects of teamwork predict both team cohesion and team performance across an array of team contexts (LePine et al., 2008). Another meta-analysis within the context of sport found that both task and social cohesion predict team performance (Carron et al., 2002). This study adds to those findings by demonstrating that athletes' perceptions of teamwork may act as an antecedent to the cohesion–performance relationship (although future research is necessary to confirm that these mediating effects exist with objective measures of team performance).

Large effects were also found when collective efficacy was examined as the mechanism between the teamwork–performance relationship. This suggests that athletes who have greater perceptions of teamwork later demonstrate greater confidence in their team's abilities to be successful, which subsequently predicts their satisfaction with the team's performance. As with the aforementioned findings on the mediating effects of team cohesion, these results also support and extend previous research within and outside of sport. Namely, research in other team contexts has been shown that team members' perceptions of various aspects of teamwork predict their beliefs that the team can be effective (LePine et al., 2008). In addition, studies with athletes have found that perceptions of collective efficacy predict team performance (e.g., Heuzé et al., 2006; Myers et al., 2004). Hence, the results of the current study help connect the findings from these two areas of research. Taken together, the collection of findings on these group variables help shed light on how athletes' ratings of teamwork can subsequently impact various emergent states (i.e., cohesion and collective efficacy), which, in turn, can predict their satisfaction with their team's performance.

Mediating Effects with Individual Variables

Mediating effects were also evident when examining the relationships between perceived teamwork and the three individual constructs—satisfaction with individual performance, enjoyment in one's sport, and commitment to one's team. Specifically, the relationships between athletes' ratings of preparation, execution, adjustments, and MTM with satisfaction in one's individual performance were mediated by athletes' enjoyment in their sport as well as their commitment to their team. These findings align with the results from previous studies within sport in terms of the positive relationships that have been shown between individual performance with both enjoyment (e.g., Barnicle & Burton, 2016) and commitment (e.g., Al-Yaaribi et al., 2016). Various aspects of teamwork have also been shown to predict omnibus measures of team member satisfaction (e.g., LePine et al., 2008). The results from the current study adds to the teamwork in sport literature by demonstrating that (a) teamwork is a positive predictor of satisfaction with one's individual performance specifically, and (b) enjoyment and commitment are two of the mechanisms that explain this relationship.

As previously noted, it is perhaps unsurprising that the mediating effects were smaller for these individual variables compared to the aforementioned group variables of task cohesion and collective efficacy, since teamwork has been conceptualized as a group variable (cf. McEwan et al., 2018). At this point, it is unclear why the significant mediating effects of enjoyment and commitment did not emerge for the evaluation aspect of teamwork. It should be recognized, however, that the effect sizes and accompanying confidence intervals for these mediating variables were quite similar across all five models of teamwork. For example, the lower limit of the confidence interval was barely below zero for the evaluation phase (-.01) and barely above zero for the execution phase (+.00). Hence, caution should be exercised in interpreting these types of findings wherein the confidence interval values that determine whether a mediating

effect is significant or not are all so close to zero. In sum, it could be *tentatively* concluded that athletes' perceptions of teamwork may predict (to a small or perhaps even marginal extent) the degree to which they will enjoy participating in their sport and will be committed to their team; in turn, these latter two variables might predict the extent to which athletes are satisfied with their own personal performance within their sport.

Limitations

In spite of the insights provided by this study, several limitations are worth noting. First, since the teams in this sample came from an array of sports and age groups, we were unable to obtain any objective measures of performance, as performance indices vary across sports (e.g., legal body checks in ice-hockey versus base-hits in baseball) and age groups (e.g., legal body checks in ice-hockey would not be relevant to younger age groups where body checking is prohibited). Thus, a subjective measure of *satisfaction* with performance was utilized. Although member satisfaction has been a prominent indicator of team effectiveness in previous teamwork research (e.g., LePine et al., 2008) and could certainly be viewed as a salient outcome within sport, it should not be conflated with an objective indicator of performance (team or individual). In addition, the sample was unintentionally comprised of 85% males, and also consisted of only one team that competed at the national level and two teams that competed at the provincial level. Although the remaining teams were competitive in nature, they were in a relatively lower level of competition—that is, teams who were selected to compete against other teams around their geographical area (i.e., 'rep' teams). While there does not appear to be any theoretical reason (cf. McEwan & Beauchamp, 2014) to hypothesize that the results obtained in this study would not extend to teams competing at the highest echelons of competition (e.g., professional or Olympic teams), additional research is nonetheless required in order to test the generalizability of these findings. Moreover, it is worth noting that the variables in this study were measured at the

individual level, as opposed to analysing the data at an aggregate/team level (e.g., with multilevel modelling), due to limitations in sample size. Hence, it is important to reiterate that the results from this study provide insight into athletes' *individual perceptions* of themselves and their teams (as opposed to teammates' shared perceptions, for example, on these variables).

Additional Potential Avenues of Future Research

Overall, the results from this study provide further evidence of *construct validity*—namely, the external aspect of validity (cf. Messick, 1995)—with regard to teamwork in sport (as measured by the MATS). Nonetheless, as this was the first study to examine the relationships between teamwork and various external measures within sport, there are some notable gaps within this literature that could be addressed through further research. For one, researchers studying teamwork in sport should continue to examine other components of the team effectiveness framework proposed by McEwan and Beauchamp (2014). One particular avenue might include examining the impact of various input variables on teamwork at the individual (e.g., team member personalities, competencies), team (e.g., team size, level of interdependence across sports), and broader organizational/external (e.g., organizational funding, cross-cultural differences) levels. Moreover, now that there appears to be initial evidence that athletes' individual perceptions of teamwork are related to their perceptions of the other variables measured in this study, researchers could examine these (or additional variables) at the group level with larger sample sizes in future studies. For example, multilevel modelling should be conducted to account for the nesting of data from team sport athletes and examine how teamwork relates to various constructs at both the individual-level (i.e., level 1) *and* the cluster-/team-level (i.e., level 2).

It has also been hypothesized (cf. Marks et al., 2001; McEwan & Beauchamp, 2014) that teamwork is impacted by various developmental processes and episodic cycles that teams go

through over time (e.g., from one game to another). This dynamic component of team effectiveness could be examined in future studies by exploring teamwork and its relationships to other pertinent variables at multiple points over time, such as from the start of the team's season to the midway point to the end of the season. Such research could also shed further light on the extent to which team processes (e.g., teamwork) and emergent states affect each other over the course of a team's tenure. Specifically, although emergent states are conceptualized as by-products that derive from teamwork (cf. Marks et al., 2001; Mathieu et al., 2008; McEwan & Beauchamp, 2014), they may also impact teamwork behaviors over time. Longitudinal research wherein measures of both teamwork and emergent states are taken at multiple time-points would allow researchers to examine whether—and the extent to which—there is indeed a reciprocal relationship between these two types of variables.

Finally, it has been shown that the five aspect of teamwork in sport can be enhanced through intervention (McEwan & Beauchamp, 2018). Specifically, McEwan and Beauchamp (2018) found significant improvements in athletes' perceptions of teamwork following participation in teamwork training (which included various team building strategies such as team goal setting, teamwork execution simulations, team charters, and so forth) over the course of ten weeks relative to athletes who did not take part in training (whose perceptions of teamwork remained mostly unchanged). Hence, one might reasonably predict (based on the results from the current study) that enhancing teamwork through team building interventions would not only improve teamwork itself but could also result in subsequent improvements in other variables, including team cohesion, collective efficacy, commitment, enjoyment, and satisfaction with performance. However, the extent to which those interventions that target teamwork truly impact these (or separate) variables remains to be tested. Such an examination would provide additional insight into the practical implications of this research—that is, with regard to the importance of

applied efforts to maximize the extent to which members of a sports team work effectively together. In summary, testing these types of research questions in relation to team effectiveness would help enhance our understanding of teamwork in sport and provide further support for construct validation in relation to this construct (cf. Messick, 1995).

Conclusion

In summary, this is the first study to provide evidence that teamwork in sport is associated with a range of adaptive group and individual variables. The findings also provide initial insight regarding the mechanisms that may explain the relationships between athletes' perceptions of teamwork and their subsequent satisfaction with performance from both an individual and team perspective. Through this, further support for the validity—specifically, the external aspect of validity—of data derived from the MATS is provided. These results suggest that teamwork is an important variable to consider within the context of sport and that athletes, coaches, and applied sport psychology consultants should aim to maximize the extent to which team members work effectively together. Future research should continue to examine other aspects of validity and—more broadly—examine how teamwork affects, and is affected by, additional variables of team effectiveness within sport settings.

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619

Table 1

Descriptive statistics and intercorrelations for teamwork scores and sport outcomes related to team cohesion, collective efficacy, satisfaction with performance, player commitment, and player enjoyment.

Variable	<i>n</i>	M	SD	1a	1b	1c	1d	1e	2	3	4	5	6	7	8
1 Teamwork	175	5.14	1.08	.89*	.92*	.82*	.94*	.83*	.71*	.38*	.64*	.63*	.33*	.30*	.30*
1a Preparation	177	5.45	1.10	–	.81*	.71*	.75*	.64*	.65*	.34*	.63*	.56*	.35*	.37*	.32*
1b Execution	177	5.00	1.25		–	.70*	.84*	.72*	.67*	.36*	.60*	.57*	.23*	.19*	.22*
1c Evaluation	175	5.41	1.13			–	.77*	.54*	.49*	.34*	.50*	.48*	.29*	.22*	.20*
1d Adjustments	176	4.93	1.21				–	.81*	.68*	.35*	.56*	.61*	.30*	.24*	.26*
1e MTM	175	4.96	1.47					–	.69*	.33*	.52*	.58*	.32*	.30*	.30*
2 Task cohesion	178	6.55	1.73						–	.55*	.71*	.67*	.39*	.44*	.44*
3 Social cohesion	178	6.92	1.49							–	.48*	.41*	.28*	.26*	.22*
4 Collective efficacy	172	7.22	2.17								–	.71*	.31*	.30*	.36*
5 Team satisfaction	171	4.58	1.55									–	.28*	.20*	.25*
6 Individual satisfaction	171	5.41	1.04										–	.45*	.51*
7 Commitment	177	4.42	0.81											–	.68*
8 Enjoyment	177	4.46	0.83												–

Note: * $p < .001$. Scale ranges are 1-7 for teamwork, 1-9 for task and social cohesion, 1-10 for collective efficacy, 1-7 for satisfaction of individual performance and team performance, and 1-5 for commitment and enjoyment. The correlations between the five aspects of teamwork and the seven external variables are noted in bold.

Table 2

Effects of Teamwork on Satisfaction with Team Performance via Task Cohesion

Model	R ²	Direct Effects	Indirect Effects	CSIE
		<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI
Preparation	.49*	.29 (.10), .09 – .49	.50 (.08), .36 – .65	.35 (.05), .26 – .45
Execution	.50*	.27 (.09), .09 – .44	.45 (.07), .32 – .59	.36 (.05), .26 – .46
Evaluation	.50*	.28 (.09), .11 – .45	.39 (.06), .27 – .52	.28 (.04), .19 – .36
Adjustments	.50*	.36 (.09), .17 – .55	.43 (.07), .30 – .57	.33 (.05), .23 – .43
MTM	.49*	.22 (.08), .06 – .38	.39 (.06), .28 – .52	.37 (.05), .27 – .47

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects

Table 3

Effects of Teamwork on Satisfaction with Team Performance via Social Cohesion

Model	R ²	Direct Effects	Indirect Effects	CSIE
		<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI
Preparation	.37*	.67 (.09), .48 – .85	.12 (.04), .05 – .22	.08 (.03), .03 – .15
Execution	.37*	.60 (.08), .44 – .77	.11 (.04), .04 – .19	.09 (.03), .03 – .15
Evaluation	.29*	.53 (.10), .34 – .72	.14 (.04), .06 – .23	.10 (.03), .04 – .16
Adjustments	.40*	.69 (.08), .52 – .86	.10 (.04), .03 – .18	.07 (.03), .02 – .14
MTM	.38*	.53 (.07), .39 – .67	.09 (.03), .03 – .15	.08 (.03), .03 – .14

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects

Table 4

Effects of Teamwork on Satisfaction with Team Performance via Collective Efficacy

Model	R ²	Direct Effects	Indirect Effects	CSIE
		<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI
Preparation	.52*	.26 (.10), .07 – .45	.52 (.07), .38 – .68	.37 (.05), .27 – .48
Execution	.53*	.28 (.08), .12 – .45	.43 (.06), .32 – .56	.34 (.05), .25 – .44
Evaluation	.52*	.23 (.08), .06 – .40	.44 (.07), .30 – .59	.31 (.05), .21 – .42
Adjustments	.59*	.40 (.08), .24 – .56	.38 (.06), .28 – .51	.29 (.04), .21 – .38
MTM	.55*	.31 (.06), .18 – .44	.31 (.05), .22 – .41	.29 (.04), .21 – .37

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects

Table 5

Effects of Teamwork on Satisfaction with Individual Performance via Enjoyment

Model	R ²	Direct Effects	Indirect Effects	CSIE
		<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI
Preparation	.28*	.21 (.06), .08 – .33	.12 (.05), .03 – .23	.12 (.05), .04 – .23
Execution	.25*	.12 (.06), .01 – .23	.07 (.04), .00 – .15	.08 (.04), .01 – .18
Evaluation	.28*	.20 (.06), .08 – .32	.07 (.05), -.01 – .17	.07 (.05), -.01 – .18
Adjustments	.27*	.17 (.06), .06 – .29	.09 (.04), .02 – .17	.10 (.04), .02 – .19
MTM	.28*	.14 (.05), .05 – .24	.08 (.03), .03 – .15	.12 (.04), .04 – .21

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects

Table 6

Effects of Teamwork on Satisfaction with Individual Performance via Commitment

Model	R ²	Direct Effects	Indirect Effects	CSIE
		<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI
Preparation	.22*	.21 (.07), .08 – .35	.11 (.04), .04 – .19	.12 (.04), .04 – .20
Execution	.20*	.14 (.06), .02 – .25	.05 (.03), .00 – .12	.06 (.04), .00 – .14
Evaluation	.22*	.20 (.06), .07 – .33	.07 (.04), -.01 – .15	.07 (.05), -.01 – .17
Adjustments	.23*	.19 (.06), .07 – .31	.07 (.03), .01 – .14	.08 (.04), .01 – .16
MTM	.22*	.16 (.05), .06 – .26	.07 (.03), .02 – .13	.10 (.04), .03 – .18

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects